

Health status and quality of life among older adults in rural Tanzania

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Background: Increasingly, human populations throughout the world are living longer and this trend is developing in sub-Saharan Africa. In developing African countries such as Tanzania, this demographic phenomenon is taking place against a background of poverty and poor health conditions. There has been limited research on how this process of ageing impacts upon the health of older people within such low-income settings.

Objective: The objective of this study is to describe the impacts of ageing on the health status, quality of life and well-being of older people in a rural population of Tanzania.

Design: A short version of the WHO Survey on Adult Health and Global Ageing questionnaire was used to collect information on the health status, quality of life and well-being of older adults living in Ifakara Health and Demographic Surveillance System, Tanzania, during early 2007. Questionnaires were administered through this framework to 8,206 people aged 50 and over.

Results: Among people aged 50 and over, having good quality of life and health status was significantly associated with being male, married and not being among the oldest old. Functional ability assessment was associated with age, with people reporting more difficulty in performing routine activities as age increased, particularly among women. Reports of good quality of life and well-being decreased with increasing age. Women were significantly more likely to report poor quality of life (odds ratio 1.31; $p < 0.001$, 95% CI 1.15–1.50).

Conclusions: Older people within this rural Tanzanian setting reported that the ageing process had significant impacts on their health status, quality of life and physical ability. Poor quality of life and well-being, and poor health status in older people were significantly associated with marital status, sex, age and level of education. The process of ageing in this setting is challenging and raises public health concerns.

Keywords: *health status; quality of life; older people; ageing; Health and Demographic Surveillance System; INDEPTH WHO-SAGE*

Access the supplementary material to this article: INDEPTH WHO-SAGE questionnaire (including variants of vignettes), a data dictionary and a password-protected dataset (see **Supplementary files** under **Reading Tools** online). To obtain a password for the dataset, please send a request with 'SAGE data' as its subject, detailing how you propose to use the data, to global.health@epiph.umu.se

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Human populations throughout the world are living longer than ever before – but this is a relatively new phenomenon in developing countries. It is estimated that nearly 63% of the population aged 60 and over are living in developing countries, and further projected that by 2050 nearly 1.5 billion older

people will reside in developing countries (1). The number of older people is growing rapidly in sub-Saharan Africa (2). Changes in the ageing process within developing countries have been observed through shifts in population age composition. This process is associated with rapid declines in fertility and mortality (3). In the

near future, larger older populations will become ubiquitous in Africa (1, 4, 5). Tanzania has a total population of 34 million of whom 4% are aged 50 and over. It is also among the countries in sub-Saharan Africa with at least 1 million older people, and this proportion is projected to rise to 10% of the total population by 2050 (6, 7). Furthermore, the absolute number of people entering the older cohort is increasing (7).

In developing African countries such as Tanzania, many older people reach retirement age after a lifetime of poverty and deprivation, poor access to health care and poor diet. This situation can leave them with insufficient personal savings as a consequence of a fragile earning history (8, 9). In most developing countries, formal social security systems have only limited coverage and inadequate benefit payments (10, 11). As a result, the majority of older people depend on family support networks, a reality that is well appreciated in most parts of sub-Saharan Africa (12–14). Furthermore, it is recognised that traditional social security systems are evolving, attenuating and rapidly disappearing due to pressures from urbanisation, industrialisation and HIV/AIDS (15). At the same time it is widely reported that older people have more substantial inter-individual variability in health related to age than do younger people (16, 17). The health care system spends a small fraction of the budget on treating older adult illness and access to care is limited and not a policy priority in most developing countries (6, 18–20).

Within developing countries the demographic transition towards older populations is likely to constrain future health care systems. The attitude of health care providers towards older people makes their situation even more difficult. It has been reported that older people in Tanzania are frequently mistreated by health care providers when they seek care (21). Although provision of free health services to older people is stipulated in the Tanzanian National Ageing policy,

many older people still do not access these services due to inability to prove their age, aggravated by the limited availability of health services, equipment and expertise (6).

The economies of rural Tanzanian settings are predominantly supported by subsistence agriculture, which provides little or no pension coverage and limited health care services. The age structure of these settings is already being impacted by the emigration of younger people to urban areas and the return of older people to rural environments from urban areas on retirement.

Current health challenges and existing policies act to hide the situation of older people. A large body of research has described the process of ageing using contrasting perspectives: demographic characteristics, physical health, cognitive impairment, disability and self-perceived health of older people in developed countries (22–24). In the developing world, studies of population ageing have been focused primarily on Asia and Latin America. In Tanzania there has been limited research on explaining process of societal ageing and impact on the health of older people, especially in rural settings where people are most beset by poverty and poor health conditions. This study aims to describe the impact of ageing on the health status and well-being of older people in a rural Tanzanian population using data collected by the Ifakara Health Institute's Health and Demographic Surveillance System (HDSS) in collaboration with the INDEPTH Network and the WHO Survey on Adult Health and Global Ageing (SAGE). Our aim was to provide a better understanding of the health and well-being of older people in developing countries. The resulting information will provide a baseline for examining the relationship between ageing and other health outcomes during demographic transition in these settings. This will help to raise awareness about the predicament of older people, support possible policy interventions and stimulate further research.

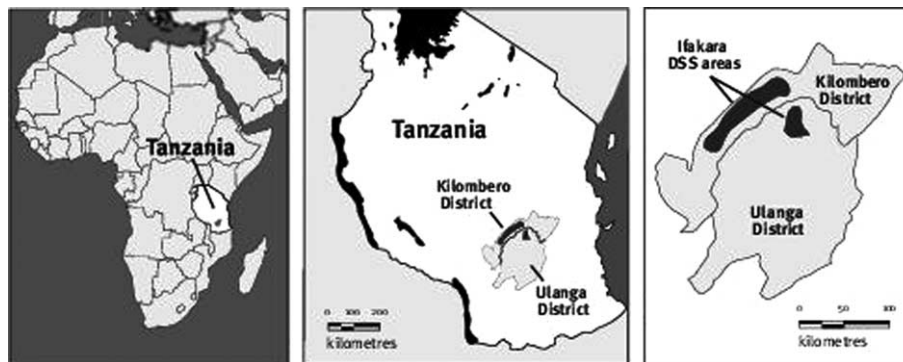


Fig. 1. Maps of Africa, Tanzania and the Ifakara HDSS area.

Design

Geography of the HDSS area

The Ifakara HDSS area is located in southern Tanzania in parts of the Kilombero and Ulanga districts, both in the Morogoro region (latitude 8.0°–8.6° S and longitude 35.9°–36.6° E), as shown in Fig. 1. The Ifakara DSS covers an area of 2,400 km² in the Kilombero Valley.

The HDSS site was initiated in September 1996. A baseline census was conducted between September and December 1996 in 25 villages covering a population of about 93,000 people living in 19,000 households. Since January 1997, each household has been visited once every 4 months to record births and pregnancies, deaths and migrations. In order to document community-based causes of death, the HDSS has conducted verbal autopsies since 2002.

The area is predominately rural with scattered households. Many local houses have brick walls but only 34% have a corrugated iron roof. The main ethnic groups are Wapogoro, Wandamba, Wabena, Wahehe and Wambugu, with several other smaller groups. Most of the inhabitants are Christian or Muslim. All residents speak the Kiswahili language. Subsistence farming of maize, rice and cassava occupies the majority of the population. Fishing is also common both for local consumption and shipping to other towns within the country.

Data collection

In January 2007, all households with people aged 50 and over were identified from the Ifakara HDSS database. These households were subsequently visited to interview these older people. The questionnaires and the consent forms were translated to Kiswahili. All field workers were trained for 3 days prior to conducting the interviews, including 1 day of tool piloting. Surveys started in the middle of January 2007 and ended in April 2007. During field work, interviewers were closely supervised by field supervisors who accompanied them on interviews, performed spot-checks and re-interviewed where appropriate. Also, desk checks on the completed questionnaires were done to identify errors before computer data entry. All questionnaires that raised queries were returned to interviewers for clarification in the field. Data entry was conducted using a double entry system in CSPro. Verbal informed consent was obtained from all older people who participated in this study. All individuals were interviewed using the WHO-abbreviated survey instrument short module adapted from the full SAGE questionnaire: the health status and associated vignette questions plus Activities of Daily Living (ADL)-type questions (following the WHO Disability Assessment Scale version II [WHODAS-II] model), and questions on subjective well-being as measured by the 8-item version of the World Health Organization Quality of Life (WHOQoL)

instrument. A copy of the INDEPTH WHO-SAGE summary questionnaire is available as a supplementary file. Additional data targeted for inclusion into the final data set, derived directly from the HDSS, included socio-demographic characteristics, such as age, sex, education, marital status, socio-economic status and household information, such as the household size.

Health status information

Health status scores were calculated based on health responses in eight health domains covering affect, cognition, interpersonal activities and relationships, mobility, pain, self-care, sleep/energy and vision. Each domain included at least two questions. Asking more than one question about difficulties in a given domain provides more robust assessments of individual health levels and reduces measurement error for any single response item. Item Response Theory (IRT) was used to score the responses to the health questions using a partial credit model which served to generate a composite health status score (25, 26). An item calibration was obtained for each item. In order to determine how well each item contributed to common global health measurement, chi-squared fit statistics were calculated. The calibration for each of the health items was taken into account and the raw scores were transformed through Rasch modelling into a continuous cardinal scale where a score of zero represents worst health and a maximum score of 100 represents best health. More details on the application of the IRT approach to computing patient-reported health outcomes are described in Chang and Reeve, and Kyobungi (27–31). The IRT has been judged as among the most efficient, reliable and valid methods to evaluate measures of health (32–37).

Quality of life and well-being

In this study we define quality of life as individual perceptions of life in the context of local culture and value systems, as well as in relation to goals, expectations, standards and concerns. An 8-item version of the WHOQoL instrument was used to assess perceived well-being (38). This is a cross-culturally valid instrument for comprehensively assessing overall subjective well-being, yet is also very brief. It recognises that health and quality of life are strongly associated yet distinct concepts. Results from the 8-items were summed to get an overall WHOQoL score which was then transformed to a 0–100 scale, similar to the health status score. The WHOQoL instruments have been used in other studies of older people in Africa (39, 40).

Functional status assessment

Personal functioning was assessed through the standardised 12-item WHODAS-II. It is a well-tested instrument, with published psychometric properties, and a good

predictor of global disability (41–43). The WHODAS is compatible with the International Classification of Functioning, Disability and Health (ICF) and contains many of the most commonly asked ADL and Instrumental Activities of Daily Living (IADL) questions. The WHODAS instrument also provides an assessment of severity of disability. Results from the 12-items were summed to get an overall WHODAS score, which was then transformed to a 0–100 scale, with zero representing no disability. Since this scale runs counterintuitively to the WHOQoL and health status scores, it was inverted to a scale designated here as WHODASi, in which 100 represents the best situation, i.e. no disability, and which thus represents a measure of functional ability.

Socio-economic status of households

The socio-economic status of households was assessed by constructing a household wealth index based on household asset ownership, level of education of the head of household and household characteristics, as proposed and validated by Filmer (44). Data on asset ownership were collected within the HDSS framework.

Data analysis

Data were analysed using Stata version 10. Simple cross-tabulations and multivariate analysis were done to describe the situation of ageing, health status, physical disability, quality of life and well-being of older people. The median values for health status, WHOQoL and WHODASi were computed, and used to define cut-off points for assessing good or poor status. Mean scores were calculated for different sex and age groups. In order to investigate the factors associated with health and quality of life, univariate and multivariate models were run. In both models, social and demographic variables were fitted as possible explanatory variables. Principal component analysis (PCA) was conducted on household characteristics and asset ownership data to investigate associations between these variables at the household level. Wealth index quartiles were constructed to investigate associations between health status and household wealth.

Results

A total of 8,206 older people from 3,914 households were identified from the Ifakara DHSS. In visits, 63% were successfully interviewed ($n = 5,131$). The majority of non-responders were men (52%) in the 50–59 age group. The reasons for non-response included hearing impairment, out-migration, refusal, death and absence during the day of the interview. Characteristics of responders and non-responders are shown in Table 1.

Among those interviewed, the majority were women ($n = 2,668$). The mean age of respondents was 62.5 years

Table 1. Background characteristics of study subjects

Variables	Respondents ($n = 5,131$)	Non-respondents ^a ($n = 3,075$)
Sex (%)		
Men	47.8	52
Women	52.2	48
Mean age (years) (SD)	62.6 (9.2)	61.3 (7.8)
Age group (years)		
50–59	43.7	48.5
60–69	32.8	33.2
70–79	18.2	17.9
80 and over	5.3	0.3
Education level (%)		
No formal education	39.3	41.4
Less than or equal to six years	56.6	45.2
More than six years	4.1	13.3
Marital status (%)		
Currently single	33.3	29.0
In current partnership	66.7	71.0
Socio-economic quartile (%)		
Lowest quartile	19.2	19.6
Second quartile	19.4	23.7
Third quartile	21.1	19.9
Highest quartile	40.3	36.7
Mean no. of household members (sd)	10.4 (6.0)	
Percentage of household members aged 50 years and over	22.9	

^aIncludes those listed in the HDSS database who had out-migrated or died prior to interview visit, and those who did not respond for other reasons.

with a standard deviation of 9.2. The majority of people in this study were within the 50–59 age group, and 67% of the respondents were married, while 39% of respondents had no formal education. In the majority of households (54%), less than 25% of household members were 50 years old or above. The mean size of households where older people lived was 10.4 (standard deviation 6.0). Only 2% of households were composed solely of older people living on their own.

Functional status assessment and quality of life

The mean and median quality of life scores (WHOQoL) were 68.2 and 68.8, respectively, with the proportion below the median decreasing with increasing age (Table 2). The mean and median functional ability scores (WHODASi)

Table 2. Distribution of quality of life (WHOQoL) and functional ability (WHODASi) outcomes by age and sex

Variables	Men (n = 2,463)	Women (n = 2,668)
Mean WHOQoL score (SD)		
50–59 years	69.3 (5.6)	68.8 (6.6)
60–69 years	68.4 (5.9)	67.6 (6.9)
70–79 years	67.0 (7.3)	67.2 (9.4)
80 years and over	64.3 (7.1)	66.1 (11.7)
Percentage of respondents with WHOQoL less than median		
50–59 years	28.8	37.0
60–69 years	39.1	50.3
70–79 years	52.8	59.7
80 years and over	67.9	71.2
Mean WHODASi score (SD)		
50–59 years	90.4 (13.4)	87.5 (14.4)
60–69 years	87.1 (14.9)	82.2 (16.2)
70–79 years	80.5 (18.1)	74.0 (21.3)
80 years and over	68.4 (22.1)	59.0 (24.9)
Percentage of respondents with WHODASi less than median		
50–59 years	35.0	43.9
60–69 years	45.2	61.2
70–79 years	62.0	73.5
80 years and over	82.1	86.5

were 84 and 90, respectively. Functional ability was lower among women than men in all age groups.

Distributions of health status

The median health status score of the surveyed population was 68.4. Health status was associated with age and gender (Table 3). Poor health status was associated with increasing age and among women.

Table 3. Distribution of self-reported health status outcomes by age and sex

Variables	Men (n = 2,463)	Women (n = 2,668)
Mean health status score (SD)		
50–59 years	74.5 (13.0)	72.1 (12.1)
60–69 years	71.5 (12.2)	68.4 (10.3)
70–79 years	67.1 (11.2)	64.5 (11.0)
80 years and over	61.3 (10.2)	58.5 (9.2)
Percentage of respondents with health status less than median		
50–59 years	34.8	41.3
60–69 years	43.8	54.2
70–79 years	60.0	66.8
80 years and over	82.7	84.7

Factors associated with poor quality of life and health status

Odds ratios for below-median quality of life and health status showed significant associations with being female, older and unmarried (Tables 4 and 5). Women were more likely to report poor health as well as being scored for lower quality of life than men. Lower quality of life was also significantly associated with the two lower socio-economic quartiles. However, no association between socio-economic status and self-reported health was evident in multivariate analysis controlling for other factors (Table 5). Age composition within households and education were not appreciably associated with either quality of life or health status in multivariate analyses.

Discussion

This study observed that among older adults men reported better health status than women, and that health status, quality of life and physical ability deteriorated markedly with increasing age. This is in line with empirical knowledge of the physiological processes of ageing and linked to disease and ill health. These results underscore the reality of existing gender biases in relation to economic power, which may be the product of lower levels of education and savings, and the poorer life-time earning histories many women have (45). The results are consistent with those reported recently by the Tanzanian Ministry of Health and Social Welfare, which found that older people make up around one-third of all disabled people in Tanzania (46). Higher quality of life and good health status was associated with being married, a high level of education and higher socio-economic status of the household. This reinforces the hypothesis that individual health is improved by education, possibly due to having greater access to information on health, better eating habits and self-care (47, 48).

These results reveal sex differences in longevity, with larger numbers of women than men aged 50 and over, despite their poorer health outcomes. The mean household size of 10 observed for households containing older people in this study area is broadly reflective of socio-cultural practices in rural areas of most countries in sub-Saharan Africa, where older people tend to live in extended family households rather than independently (49). This is reflective of the current Tanzania Ageing policy which prioritises family as the basic institution of care and support for older people (50).

Few studies have been conducted on adult health and ageing in Tanzania. The approach of assessing individual health status based on self-reported health status has been criticised by various scholars, and it has been suggested that self-reported health status should not be used to estimate disease prevalence and identify individuals with disease (47, 51). Thus, although the current

Table 4. Factors associated with below-median quality of life (WHOQoL)

Variables	Univariate model (OR and 95% CI)	<i>p</i> -value	Multivariate model (OR and 95% CI)	<i>p</i> -value
Sex				
Men	1			
Women	1.37 (1.22–1.53)	<i>p</i> < 0.001	1.27 (1.11–1.45)	<i>p</i> < 0.001
Age group (years)				
50–59	1		1	
60–69	1.63 (1.43–1.86)	<i>p</i> < 0.001	1.57 (1.38–1.80)	<i>p</i> < 0.001
70–79	2.60 (2.22–3.04)	<i>p</i> < 0.001	2.37 (2.01–2.80)	<i>p</i> < 0.001
80+	4.52 (3.44–5.92)	<i>p</i> < 0.001	4.33 (3.26–5.75)	<i>p</i> < 0.001
Education level				
No formal education	1.63 (1.22–2.19)	<i>p</i> = 0.001	1.17 (0.86–1.60)	<i>p</i> = 0.315
Less than or equal to six years	1.46 (1.30–1.64)	<i>p</i> < 0.001	1.03 (0.76–1.39)	<i>p</i> = 0.845
More than six years	1			
Marital status				
Now single	1.62 (1.44–1.82)	<i>p</i> < 0.001	1.19 (1.04–1.37)	<i>p</i> = 0.010
In current partnership	1		10	
Proportion aged 50 years and over in the same household (%)				
<25	0.79 (0.63–0.98)	<i>p</i> = 0.035	0.92 (0.69–1.23)	<i>p</i> = 0.575
25–49	0.80 (0.63–1.00)	<i>p</i> = 0.049	0.96 (0.75–1.23)	<i>p</i> = 0.749
50–74	0.86 (0.65–1.13)	<i>p</i> = 0.272	1.05 (0.83–1.33)	<i>p</i> = 0.697
≤75	1		1	
Socio-economic quartile				
Lowest quartile	0.71 (0.61–0.82)	<i>p</i> < 0.001	0.71 (0.69–0.99)	<i>p</i> = 0.042
Second quartile	0.61 (0.52–0.71)	<i>p</i> < 0.001	0.62 (0.63–0.87)	<i>p</i> < 0.001
Third quartile	0.81 (0.70–0.94)	<i>p</i> = 0.006	0.75 (0.75–1.03)	<i>p</i> = 0.118
Highest quartile	1		1	

study indicates a clear association between older people's perception of age and health, further medically based studies are required to confirm the health burden of older people in rural Tanzania. Following up this sample over time would be useful to see how these data relate to subsequent health outcomes.

Several studies have shown socio-economic status to be associated with older people's health status, quality of life and well-being (52–54). However, the current study also detected an association between household socio-economic status and quality of life, but not between wealth and self-reported health description. Similar observations have been documented elsewhere (55), and may be due to the fact that household asset-based wealth indices can be unrelated to individual health status, depending on which member of the household is head and who owns assets (56).

Although Tanzania is the second country in Africa to have a national Ageing policy, after Mauritius, many issues related to older people are not yet fully defined. For example, even in the National Strategy for Poverty

Reduction (57), older people are not fully considered. Older people are widely recognised as being a valuable source of information, knowledge and experience. Thus, attempts should be made to consider and improve their health status and quality of life within this and other rural settings in Tanzania and other developing countries.

Conclusion

The health status and quality of life of older people in rural Tanzania is reduced significantly during the ageing process. Perceptions of physical disability also increase with age in this population. Poor quality of life and well-being, and health status in older people are significantly related to marital status, sex and age. Specifically, quality of life decreases with age, and women experience poorer quality of life and a greater burden of physical disability than men. Thus, the process of ageing presents a clear public health challenge in this setting.

Table 5. Factors associated with below-median health status responses

Variables	Univariate model (OR and 95% CI)	<i>p</i> -value	Multivariate model (OR and 95% CI)	<i>p</i> -value
Sex				
Men	1		1	
Women	1.28 (1.14–1.44)	<i>p</i> < 0.001	1.33 (1.15–1.52)	<i>p</i> < 0.001
Age group (years)				
50–59	1		1	
60–69	1.56 (1.36–1.80)	<i>p</i> < 0.001	1.57 (1.36–1.81)	<i>p</i> < 0.001
70–79	2.98 (2.53–3.49)	<i>p</i> < 0.001	2.96 (2.50–3.51)	<i>p</i> < 0.001
80+	8.95 (6.71–11.96)	<i>p</i> < 0.001	8.96 (6.64–12.09)	<i>p</i> < 0.001
Education level				
No formal education	1.74 (1.27–2.40)	<i>p</i> = 0.001	1.24 (0.88–1.74)	<i>p</i> = 0.27
Less than or equal to 6 years	1.32 (0.97–1.82)	<i>p</i> = 0.082	1.25 (0.90–1.74)	<i>p</i> = 0.180
More than 6 years	1		1	
Marital status				
Now single	1.57 (1.39–1.77)	<i>p</i> < 0.001	1.16 (1.00–1.33)	<i>p</i> = 0.045
In current partnership	1		1	
Proportion aged 50 years and over in the same household (%)				
<25	0.94 (0.74–1.20)	<i>p</i> = 0.633	1.21 (0.93–1.58)	<i>p</i> = 0.147
25–49	1.06 (0.82–1.37)	<i>p</i> = 0.644	1.21 (0.92–1.59)	<i>p</i> = 0.162
50–74	1.11 (0.79–1.56)	<i>p</i> = 0.558	1.17(0.82–1.68)	<i>p</i> = 0.384
≤75%	1		1	
Socio-economic quartile				
Lowest quartile	0.92 (0.78–1.08)	<i>p</i> = 0.293	1.13 (0.95–1.34)	<i>p</i> = 0.176
Second quartile	0.72 (0.62–0.85)	<i>p</i> < 0.001	0.89 (0.75–1.60)	<i>p</i> = 0.206
Third quartile	0.84 (0.72–0.97)	<i>p</i> = 0.022	0.92 (0.78–1.08)	<i>p</i> = 0.296
Highest quartile	1		1	

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References

1. UN. World population prospects: the 2000 revision. New York: UN; 2001.
2. Mba CJ. Nigeria's ageing population: a call for attention. *J Int Instit Ageing* 2001; 12: 15–24.
3. Mbamaonyekwu CJ. Africa's ageing populations. *J Int Instit Ageing* 2001; 11: 2–7.
4. Mba C. Determinants of living arrangements of Lesotho's older persons female population. *J Int Women's Stud* 2002; 3: 1–22.
5. United Nations, Population Division, Affairs. DoEaS. Population ageing. New York: United Nations, Population Division, Affairs; 1999.
6. URT. The Ministry of labour, youth Development and Sports National Aging Policy. In: Ministry of labour, Youth Development and Sports, eds. United Republic of Tanzania Population and Housing census. Dar es Salaam: United Republic of Tanzania; 2003, pp. 3–7.
7. URT. Population and housing census. Dar es Salaam: United Republic of Tanzania, National Bureau of Statistics; 2002.
8. Charton KE, Rose D. Nutrition among older adults in Africa: the situation at the beginning of the millennium. *J Nutri* 2001; 131: 245–85.
9. Kimokoti RW, Hamer DH. Nutrition, health, and aging in sub Saharan Africa. *J Nutrition* 2008; 66: 611–23.
10. Bailey C. Governance of social security schemes: social security documentation. International Social Security Association 2000; 21: 71–113.
11. Colin G, Turner J, Bailey C, Latulippe D. Social security pensions: development and reform. Geneva: International Labour Office; 2000.

12. Van de Walle E. African households: censuses and surveys. London: Word Bank; 2006.
13. Kaseke E. An overview of formal and informal social security systems in Africa. USA and Johannesburg, South Africa: National Academy of Sciences; 2004.
14. Deaton A, Paxson CH. Patterns of aging in Thailand and Côte d'Ivoire. In: Wise DA, ed. Topics in the economics of aging. Chicago, IL: University of Chicago Press; 1992, pp. 163–206.
15. Tostensen A. Towards feasible social security systems in sub-Saharan Africa. In: Grimm M, ed. Bergen: World Bank; 2004, p. 14.
16. Fialova D, Onder G. Medication errors in elderly people: contributing factors and future perspectives. *Br J Clin Pharmacol* 2009; 67: 641–5.
17. Bedard M, Gibbons C, Dubois S. The needs of rural and urban young, middle-aged and older adults with a serious mental illness. *Can J Rural Med* 2007; 12: 167–75.
18. Feachem RGA, Kjellstrom T, Murray CJL, Over M, Phillips MA. The health of adults in the developing world. New York: Oxford University Press; 1992.
19. Poullier JP, Hernandez P, Kawabata K. Health systems performance assessment: debates, methods, and empiricism. In: Evans ICJLMA, ed. National health accounts: concepts, data sources, and methodology. Geneva: World Health Organization; 2003, pp. 185–93.
20. Tollman S, Doherty J, Mulligan JA. General primary care. In: Jamison DT, Jamison JG, Measham AR, Alleyne G, Claeson M, Evans DB, Jha P, Mills A, Musgrove P, ed. Disease control priorities in developing countries. Washington, DC: International Bank for Reconstruction and Development and the World Bank; 2006, pp. 1193–209.
21. HelpAge. HelpAge International targets 2005–2010. Johannesburg: HelpAge; 2007.
22. O'Reilly D, Rosato M, Petterson C. Self reported health and mortality: ecological analysis on based on electoral wards across the United Kingdom. *BMJ* 2005; 331: 988–9.
23. Xie J, Mathews FE, Jagger C, Bond J, Brayne C. The oldest old in England and Wales: a descriptive analysis based on MRC cognitive function and ageing study. *Age and Ageing* 2008; 37: 396–402.
24. Xu X, Jensen G. Health effects of managed care among the near older persons. *J Aging Health* 2008; 18: 507.
25. Wilson TR, Alexander DJ, Kind P. Measurement of health-related quality of life in the early follow-up of colon and rectal cancer. *Dis Colon Rectum* 2006; 49: 1692–702.
26. Andrich D. Controversy and the Rasch model: a characteristic of incompatible paradigms? *Med Care* 2004; 42: 17–6.
27. Chang C, Reeve B. Item responses theory and its applications to patient-reported outcomes measurements. *Eval Health Prof* 2005; 28: 264–82.
28. Kyobutungi C, Ezech AC, Zulu E, Falkingham J. HIV/AIDS and the health of older people in the slums of Nairobi, Kenya: results from a cross sectional survey. *BMC Public Health* 2009; 9: 153.
29. Dolan P, Lee H, King D, Metchelfe R. How does NICE value health? *BMJ* 2009; 339: b2577.
30. Kahneman D, Krueger AB, Schkade DA, Schwarz N, Stone AA. A survey method for characterizing daily life experience: the day reconstruction method. *Science* 2004; 306: 1776–80.
31. Salomon JA, Murray CJL. A multi-method approach to measuring health-state evaluations. *Health Economics* 2003; 13: 281–90.
32. Ware JE Jr., Kosinski M, Bjorner JB, Bayliss MS, Batenhorst A, Dahllof CG et al. Applications of computerized adaptive testing (CAT) to the assessment of headache impact. *Qual Life Res* 2003; 12: 935–52.
33. Saliba D, Orlando M, Wenger NS, Hays RD, Rubenstein LZ. Identifying a short functional disability screen for older persons. *J Gerontol A Biol Sci Med Sci* 2000; 55: M750–6.
34. Saha TD, Compton WM, Pulay AJ, Stinson FS, Ruan WJ, Smith SM et al. Dimensionality of DSM-IV nicotine dependence in a national sample: an item response theory application. *Drug Alcohol Depend* 2009; 108: 21–8.
35. Revicki DA, Cella DF. Health status assessment for the twenty-first century: item response theory, item banking and computer adaptive testing. *Qual Life Res* 1997; 6: 595–600.
36. Jenkinson C, Fitzpatrick R, Garratt A, Peto V, Stewart-Brown S. Can item response theory reduce patient burden when measuring health status in neurological disorders? Results from Rasch analysis of the SF-36 physical functioning scale (PF-10). *J Neurol Neurosurg Psychiatry* 2001; 71: 220–4.
37. Reeve BB, Hays RD, Bjorner JB, Cook KF, Crane PK, Teresi JA et al. Psychometric evaluation and calibration of health-related quality of life item banks: plans for the Patient-Reported Outcomes Measurement Information System (PROMIS). *Med Care* 2007; 45: S22–31.
38. Schmidt P, Clouth J, Haggemuller L, Naber D, Reitberger U. Constructing an index for the Subjective Well-being Under Neuroleptics scale (SWN), short form: applying structural equation modeling for testing reliability and validity of the index. *Qual Life Res* 2006; 15: 1191–202.
39. Gureje O, Kola L, Afolabi E, Olley BO. Determinants of quality of life of elderly Nigerians: results from the Ibadan study of ageing. *Afr J Med Med Sci* 2008; 37: 239–47.
40. Sen A. Public action and the quality of life in developing countries. *Oxf Bull Econ Stat* 1981; 43: 287–319.
41. O'Donovan DK. Angle on disability. *Lancet* 1989; 2: 866.
42. Sousa RM, Ferri CP, Acosta D, Albanese E, Guerra M, Huang Y et al. Contribution of chronic diseases to disability in elderly people in countries with low and middle incomes: a 10/66 dementia research group population-based survey. *Lancet* 2009; 374: 1821–30.
43. Luciano JV, Ayuso-Mateos JL, Fernandez A, Aguado J, Serrano-Blanco A, Roca M et al. Utility of the twelve-item World Health Organization Disability Assessment Schedule II (WHO-DAS II) for discriminating depression “caseness” and severity in Spanish primary care patients. *Qual Life Res* 2009; 19: 97–101.
44. Filmer D, Pritchett LH. Estimating wealth effects without expenditure data – or tears: an application to educational enrolments in states of India. *Demography* 2001; 38: 115–32.
45. Kinsella K, Phillips DR. Global aging: the challenge of success. Washington, DC: Population Reference Bureau; 2005.
46. Welfare MoHaS. Tanzania Disability survey. Johannesburg: World bank; 2009.
47. Goldman N, Gleit DA. Sex differences in relationship between DHEAS and health experimental. *Gerontology* 2007; 42: 979–87.
48. Herd P, Goesling B, House JS. Socioeconomic position and health: the differential effects of education versus income on the onset versus progression of health problems. *Journal of Health and Social Behavior* 2007; 48: 223–38.
49. Van de Walle E. African households: censuses and surveys. London: World Bank; 2006.
50. United Republic of Tanzania. The Ministry of Labour, Youth Development and Sports National Aging Policy. In: Ministry of Labour, Youth Development and Sports, ed. Dar es Salaam: United Republic of Tanzania; 2003.
51. Coster W, Ludlow L, Mancini M. Using IRT variable maps to enrich understanding of rehabilitation data. *J Outcome Meas* 1999; 3: 123–33.

52. Marmot M, Brunner E. Cohort profile: the Whitehall II Study. *International Journal of Epidemiology* 2005; 34: 251–56.
53. Ye L, Waite LJ. The impact of childhood and adult SES on physical, mental, and cognitive well-being in later life. *Journals of Gerontology Series B: Psychological Science and Social Science* 2005; 60: S93–S101.
54. Meich RA, Hauser RM. Socioeconomic status and health at midlife: a comparison of educational attainment with occupation-based indicators. *Annals of Epidemiology* 2001; 11: 75–84.
55. Tavallaii SA, Einollahi B, Azizabadi Farahani M, Namdari M. Socioeconomic links to health-related quality of life, anxiety, and depression in kidney transplant recipients. *Iran J Kidney Dis* 2009; 3: 40–4.
56. Smith V, Goldman N. Socioeconomic differences in health among older adults in Mexico. *Social Science and Medicine* 2007; 65: 1372–85.
57. United Republic of Tanzania national Strategy for Growth and Reduction of Poverty; 2005. Available from: [http://www.siteresources.worldbank.org/INTPRS1/Resources/TanzaniaPRSP\(June-2005\).pdf](http://www.siteresources.worldbank.org/INTPRS1/Resources/TanzaniaPRSP(June-2005).pdf) [cited 3 May 2010].

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